

PATENT COOPERATION TREATY

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NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents
United States Patent and Trademark
Office
Box PCT
Washington, D.C. 20231
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 12 October 2000 (12.10.00)	
International application No. PCT/NL00/00072	Applicant's or agent's file reference N/WS85/Mt/31
International filing date (day/month/year) 04 February 2000 (04.02.00)	Priority date (day/month/year) 05 February 1999 (05.02.99)
Applicant KRAMER, Gerardus, Maria et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

04 September 2000 (04.09.00)

☐ in a notice effecting later election filed with the International Bureau on:2. The election ☒ was☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

Juan Cruz

Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference N/WS85/Mt/31	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/NL 00/ 00072	International filing date (day/month/year) 04/02/2000	(Earliest) Priority Date (day/month/year) 05/02/1999
Applicant ALLSEAS GROUP S.A.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 2 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (see Box II).

4. With regard to the title,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

1

☐ Non of the figures.

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/NL 00/00072

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7. B23K9/028

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B23K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 3 922 517 A (NELSON ET AL.) 25 November 1975 (1975-11-25) column 9, line 29 - line 60; figure 4	1-3,8-10
Y	US 5 347 101 A (BRENNAN ET AL.) 13 September 1994 (1994-09-13) column 3, paragraph 2 - paragraph 4; figures 2,4	1-3,8-10
A	US 4 373 125 A (KAZLAUSKAS) 8 February 1983 (1983-02-08) column 7, paragraph 3 - column 8, paragraph 4; figure 1	4-7

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

9 May 2000

Date of mailing of the international search report

07/06/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Herbreteau, D

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/NL 00/00072


Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 3922517	A	25-11-1975	GB 1427329 A	10-03-1976
			CA 1003504 A	11-01-1977
			IT 988294 B	10-04-1975
US 5347101	A	13-09-1994	NO 950096 A	08-08-1995
US 4373125	A	08-02-1983	NONE	

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference N/WS85/M/31		FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/415)
International application No. PCT/NL00/00072	International filing date (day/month/year) 04/02/2000	Priority date (day/month/year) 05/02/1999	
International Patent Classification (IPC) or national classification and IPC B23K9/028			
Applicant ALLSEAS GROUP S.A. et al.			
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 2 sheets.</p>			
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> I <input checked="" type="checkbox"/> Basis of the report II <input type="checkbox"/> Priority III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability IV <input type="checkbox"/> Lack of unity of invention V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability, citations and explanations supporting such statement VI <input type="checkbox"/> Certain documents cited VII <input checked="" type="checkbox"/> Certain defects in the international application VIII <input type="checkbox"/> Certain observations on the international application 			
Date of submission of the demand 04/09/2000		Date of completion of this report 15.05.2001	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel: +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized officer De Backer, T Telephone No. +49 89 2399 7403	



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/NL00/00072

I. Basis of the report

1. With regard to the elements of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17):*)

Description, pages:

1-7 as originally filed

Claims, No.:

1-9 as received on 27/04/2001 with letter of 26/04/2001

Drawings, sheets:

1/4-4/4 as originally filed

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/NL00/00072

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c));

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-9
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-9
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-9
	No:	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

- D1: US-A-3 922 517 (NELSON ET AL.) 25 November 1975 (1975-11-25)
- D2: US-A-5 347 101 (BRENNAN ET AL.) 13 September 1994 (1994-09-13)
- D3: US-A-4 373 125 (KAZLAUSKAS) 8 February 1983 (1983-02-08)
- D4: JP-A-9262667

1. The subject-matter of claim 1 is new and inventive (Art. 33(2) and Art. 33(3) PCT).
 - 1.1 A method comprising the steps of the preamble of claim 1 (see also description page 1, line 13-22) is considered to represent the most relevant prior art.
Remark: The expression "for instance" has no limiting effect on the scope of the claim and the feature following this expression is regarded as entirely optional.
 - 1.2 The subject-matter of claim 1 differs from the closest prior art in that two welding layers are laid in one welding pass by means of two welding torches placed successively at a predetermined fixed distance in the longitudinal direction of the weld groove and that two carriers each having two welding torches are moved in peripheral direction of the bodies.
 - 1.3 The problem to be solved by the invention is how to shorten the welding time.
 - 1.4 Prior documents D2 and D3 disclose a method where multiple welding torches are used, each welding torch is moved by one carrier, and only one welding layer is laid in one welding pass.
Prior art document D4 discloses a method for improving the efficiency of the welding process by using two welding torches (4a, 4b) placed successively at a predetermined distance in the longitudinal direction of the weld groove and each welding torch is moved by one carrier (3a, 3b), see Figure. With this method two welding layers can be laid in one welding pass.
 - 1.5 The combination of the closest prior art with D2, D3 or D4 does not lead the skilled man to the invention. Hence the subject-matter of claim 1 is inventive.

EXAMINATION REPORT - SEPARATE SHEET

2. Claims 2-6 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step (Art. 33(2) and Art. 33(3) PCT).
3. The subject-matter of claim 7 is new and inventive (Art. 33(2) and Art. 33(3) PCT).
- 3.1 Document D4 is considered to represent the closest prior art and discloses (the references in parentheses applying to this document):

A device for welding together two bodies (10) which are placed mutually in line against each other while leaving clear a weld groove, comprising a carrier (3a) for a welding torch (4a) guidable in longitudinal direction of the weld groove and at least two carriers (3a, 3b) each having one welding torch (4a, 4b) lying successively in the longitudinal direction of the weld groove.

Remarks:

 - (i) A weld groove between the two bodies is considered is being implicitly disclosed as this is normal welding practice.
 - (ii) The expression "for instance" has no limiting effect on the scope of the claim and the feature following this expression is regarded as entirely optional.
- 3.2 The subject-matter of claim 7 differs from D4 in that the at least two carriers each have at least two welding torches.
- 3.3 The subject-matter of claim 7 is inventive for the same reasoning mentioned in paragraphs 1.3-1.5.
4. Claims 8-9 are dependent on claim 7 and as such also meet the requirements of the PCT with respect to novelty and inventive step (Art. 33(2) and Art. 33(3) PCT).

Re Item VII**Certain defects in the international application**

1. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D4 is not mentioned in the description, nor is this document identified therein.
2. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

CLAIMS

27 04 2001

(68)

1. Method for welding together two bodies, for instance pipes or plates, which are placed mutually in line against each other while leaving clear a weld groove, wherein the weld groove is filled with more than one welding layer by means of a welding torch moved in longitudinal direction of the weld groove, characterized in that two welding layers are laid in one welding pass by means of two welding torches placed successively at a predetermined fixed distance in the longitudinal direction of the weld groove and that two carriers each having two welding torches are moved in peripheral direction of the bodies.

2. Method as claimed in claim 1, wherein the weld groove has outward diverging walls, characterized in that at least the trailing welding torch performs an oscillating movement.

3. Method as claimed in claim 2, characterized in that the trailing welding torch is oscillated at a greater amplitude than the leading welding torch.

4. Method as claimed in claim 3, characterized in that the trailing welding torch is oscillated at a frequency differing from that of the leading welding torch.

5. Method for welding together two pipes as claimed in any of the preceding claims, characterized in that each carrier is moved per welding pass over half a peripheral part of the pipes.

6. Method as claimed in claim 5, characterized in that each carrier is moved per welding pass in downward peripheral direction of the pipes.

7. Device for welding together two bodies, for instance pipes or plates, which are placed mutually in line against each other while leaving clear a weld groove, comprising a carrier for a welding torch guidable in longitudinal direction of the weld groove, characterized by at least two carriers each having at

least two welding torches lying successively in the longitudinal direction of the weld groove.

8. Device as claimed in claim 7, wherein the weld groove has outward diverging walls, characterized by means for moving at least each trailing welding torch reciprocally in transverse direction of the weld groove.

9. Device as claimed in claim 8, characterized in that these means are formed by a shaft pin driven for reciprocal sliding in each carrier and connected to the respective welding torch.

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REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

RECORD COPY

For receiving Office use only

PCT/NL 00 / 00072

International Application No.

International Filing Date

04 FEB 2000 (4.02.00)

BUREAU VOOR DE INDUSTRIËLE EIGENDOM
P.C.T. INTERNATIONAL APPLICATION

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference

(if desired) (12 characters maximum)

N/WS85/Mt/31

Box No. I TITLE OF INVENTION

Method and device for welding together two bodies

Box No. II APPLICANT

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

Allseas Group S.A.
5, Route de la Coula
CH-1618 Châtel-St. Denis
Switzerland

☐ This person is also inventor.

Telephone No.

Facsimile No.

Teleprinter No.

State (that is, country) of nationality:

Switzerland

State (that is, country) of residence:

Switzerland

This person is applicant for the purposes of:

☐ all designated States

☒ all designated States except the United States of America

☐ the United States of America only

☐ the States indicated in the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

Kramer, Gerardus Maria
Bastiaanpoort 44
NL-2611 MC Delft
The Netherlands

This person is:

☐ applicant only

☒ applicant and inventor

☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

The Netherlands

State (that is, country) of residence:

The Netherlands

This person is applicant for the purposes of:

☐ all designated States

☐ all designated States except the United States of America

☒ the United States of America only

☐ the States indicated in the Supplemental Box

☒ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:

☒ agent

☐ common representative

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

't Jong, Bastiaan Jacobus
ARNOLD & SIEDSMA
Sweelinckplein 1
NL-2517 GK The Hague
The Netherlands

Telephone No.

+31 70 3654833

Facsimile No.

+31 70 3452140

Teleprinter No.

--

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Continuation of Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

If none of the following sub-boxes is used, this sheet should not be included in the request.

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

Kastelein, Maarten Willem
Bosboom Toussaintlaan 9
NL-2103 SK Heemstede
The Netherlands

This person is:

- ☐ applicant only
☒ applicant and inventor
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

The Netherlands

State (that is, country) of residence:

The Netherlands

This person is applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

This person is:

- ☐ applicant only
☐ applicant and inventor
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

State (that is, country) of residence:

This person is applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

This person is:

- ☐ applicant only
☐ applicant and inventor
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

State (that is, country) of residence:

This person is applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

This person is:

- ☐ applicant only
☐ applicant and inventor
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

State (that is, country) of residence:

This person is applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on another continuation sheet.

Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

Regional Patent

- ☒ **AP** **ARIPO Patent:** GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SL Sierra Leone, SZ Swaziland, TZ United Republic of Tanzania, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☒ **EA** **Eurasian Patent:** AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ **EP** **European Patent:** AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ **OA** **OAPI Patent:** BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line)

National Patent (if other kind of protection or treatment desired, specify on dotted line):

- | | |
|---|---|
| <input checked="" type="checkbox"/> AE United Arab Emirates | <input checked="" type="checkbox"/> LR Liberia |
| <input checked="" type="checkbox"/> AL Albania | <input checked="" type="checkbox"/> LS Lesotho |
| <input checked="" type="checkbox"/> AM Armenia | <input checked="" type="checkbox"/> LT Lithuania |
| <input checked="" type="checkbox"/> AT Austria | <input checked="" type="checkbox"/> LU Luxembourg |
| <input checked="" type="checkbox"/> AU Australia | <input checked="" type="checkbox"/> LV Latvia |
| <input checked="" type="checkbox"/> AZ Azerbaijan | <input checked="" type="checkbox"/> MA Morocco |
| <input checked="" type="checkbox"/> BA Bosnia and Herzegovina | <input checked="" type="checkbox"/> MD Republic of Moldova |
| <input checked="" type="checkbox"/> BB Barbados | <input checked="" type="checkbox"/> MG Madagascar |
| <input checked="" type="checkbox"/> BG Bulgaria | <input checked="" type="checkbox"/> MK The former Yugoslav Republic of Macedonia |
| <input checked="" type="checkbox"/> BR Brazil | <input checked="" type="checkbox"/> MN Mongolia |
| <input checked="" type="checkbox"/> BY Belarus | <input checked="" type="checkbox"/> MW Malawi |
| <input checked="" type="checkbox"/> CA Canada | <input checked="" type="checkbox"/> MX Mexico |
| <input checked="" type="checkbox"/> CH and LI Switzerland and Liechtenstein | <input checked="" type="checkbox"/> NO Norway |
| <input checked="" type="checkbox"/> CN China | <input checked="" type="checkbox"/> NZ New Zealand |
| <input checked="" type="checkbox"/> CR Costa Rica | <input checked="" type="checkbox"/> PL Poland |
| <input checked="" type="checkbox"/> CU Cuba | <input checked="" type="checkbox"/> PT Portugal |
| <input checked="" type="checkbox"/> CZ Czech Republic | <input checked="" type="checkbox"/> RO Romania |
| <input checked="" type="checkbox"/> DE Germany | <input checked="" type="checkbox"/> RU Russian Federation |
| <input checked="" type="checkbox"/> DK Denmark | <input checked="" type="checkbox"/> SD Sudan |
| <input checked="" type="checkbox"/> DM Dominica | <input checked="" type="checkbox"/> SE Sweden |
| <input checked="" type="checkbox"/> EE Estonia | <input checked="" type="checkbox"/> SG Singapore |
| <input checked="" type="checkbox"/> ES Spain | <input checked="" type="checkbox"/> SI Slovenia |
| <input checked="" type="checkbox"/> FI Finland | <input checked="" type="checkbox"/> SK Slovakia |
| <input checked="" type="checkbox"/> GB United Kingdom | <input checked="" type="checkbox"/> SL Sierra Leone |
| <input checked="" type="checkbox"/> GD Grenada | <input checked="" type="checkbox"/> TJ Tajikistan |
| <input checked="" type="checkbox"/> GE Georgia | <input checked="" type="checkbox"/> TM Turkmenistan |
| <input checked="" type="checkbox"/> GH Ghana | <input checked="" type="checkbox"/> TR Turkey |
| <input checked="" type="checkbox"/> GM Gambia | <input checked="" type="checkbox"/> TT Trinidad and Tobago |
| <input checked="" type="checkbox"/> HR Croatia | <input checked="" type="checkbox"/> TZ United Republic of Tanzania |
| <input checked="" type="checkbox"/> HU Hungary | <input checked="" type="checkbox"/> UA Ukraine |
| <input checked="" type="checkbox"/> ID Indonesia | <input checked="" type="checkbox"/> UG Uganda |
| <input checked="" type="checkbox"/> IL Israel | <input checked="" type="checkbox"/> US United States of America |
| <input checked="" type="checkbox"/> IN India | <input checked="" type="checkbox"/> UZ Uzbekistan |
| <input checked="" type="checkbox"/> IS Iceland | <input checked="" type="checkbox"/> VN Viet Nam |
| <input checked="" type="checkbox"/> JP Japan | <input checked="" type="checkbox"/> YU Yugoslavia |
| <input checked="" type="checkbox"/> KE Kenya | <input checked="" type="checkbox"/> ZA South Africa |
| <input checked="" type="checkbox"/> KG Kyrgyzstan | <input checked="" type="checkbox"/> ZW Zimbabwe |
| <input checked="" type="checkbox"/> KP Democratic People's Republic of Korea | |
| <input checked="" type="checkbox"/> KR Republic of Korea | |
| <input checked="" type="checkbox"/> KZ Kazakhstan | |
| <input checked="" type="checkbox"/> LC Saint Lucia | |
| <input checked="" type="checkbox"/> LK Sri Lanka | |

Check-boxes reserved for designating States which have become party to the PCT after issuance of this sheet:

- ☐
- ☐

Precautionary Designation Statement: In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation (including fees) must reach the receiving Office within the 15-month time limit.)


Box No. VI PRIORITY CLAIM		<input type="checkbox"/> Further priority claims are indicated in the Supplemental Box.		
Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:		
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item (1) (05.02.99) 5 February 1999	1011223	The Netherlands		
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Box No. VIII CHECK LIST: LANGUAGE OF FILING	
This international application contains the following number of sheets: request : 4 description (excluding sequence listing part) : 7 claims : 2 abstract : 1 drawings : 4 sequence listing part of description : Total number of sheets : 18	This international application is accompanied by the item(s) marked below: 1. <input checked="" type="checkbox"/> fee calculation sheet 2. <input type="checkbox"/> separate signed power of attorney 3. <input type="checkbox"/> copy of general power of attorney; reference number, if any: 4. <input type="checkbox"/> statement explaining lack of signature 5. <input type="checkbox"/> priority document(s) identified in Box No. VI as item(s): 6. <input type="checkbox"/> translation of international application into (language): 7. <input type="checkbox"/> separate indications concerning deposited microorganism or other biological material 8. <input type="checkbox"/> nucleotide and/or amino acid sequence listing in computer readable form 9. <input checked="" type="checkbox"/> other (specify): Search Report
Figure of the drawings which should accompany the abstract: 1	Language of filing of the international application: Dutch

Box No. IX SIGNATURE OF APPLICANT OR AGENT
Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).  't Jong, Bastiaan Jacobus

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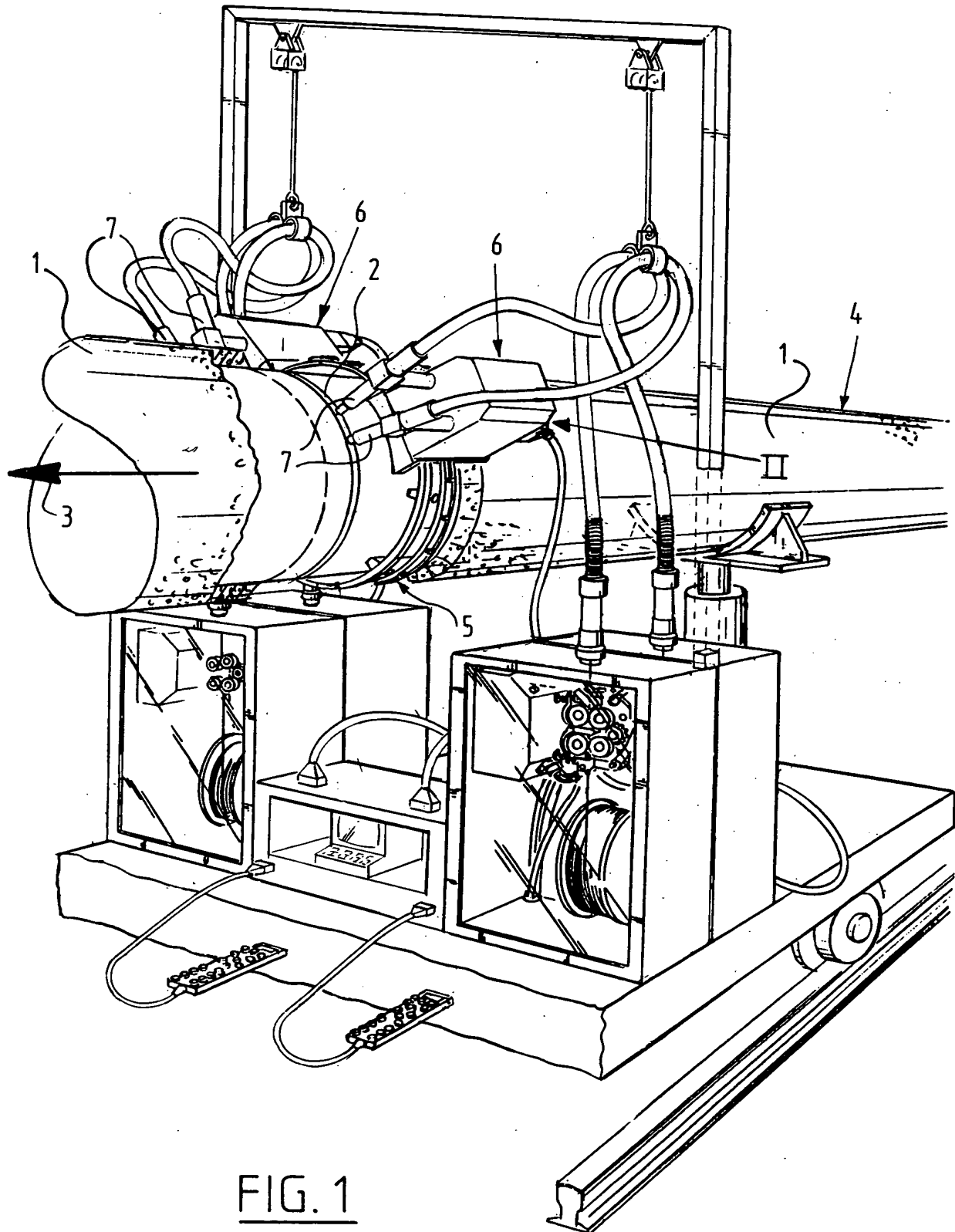
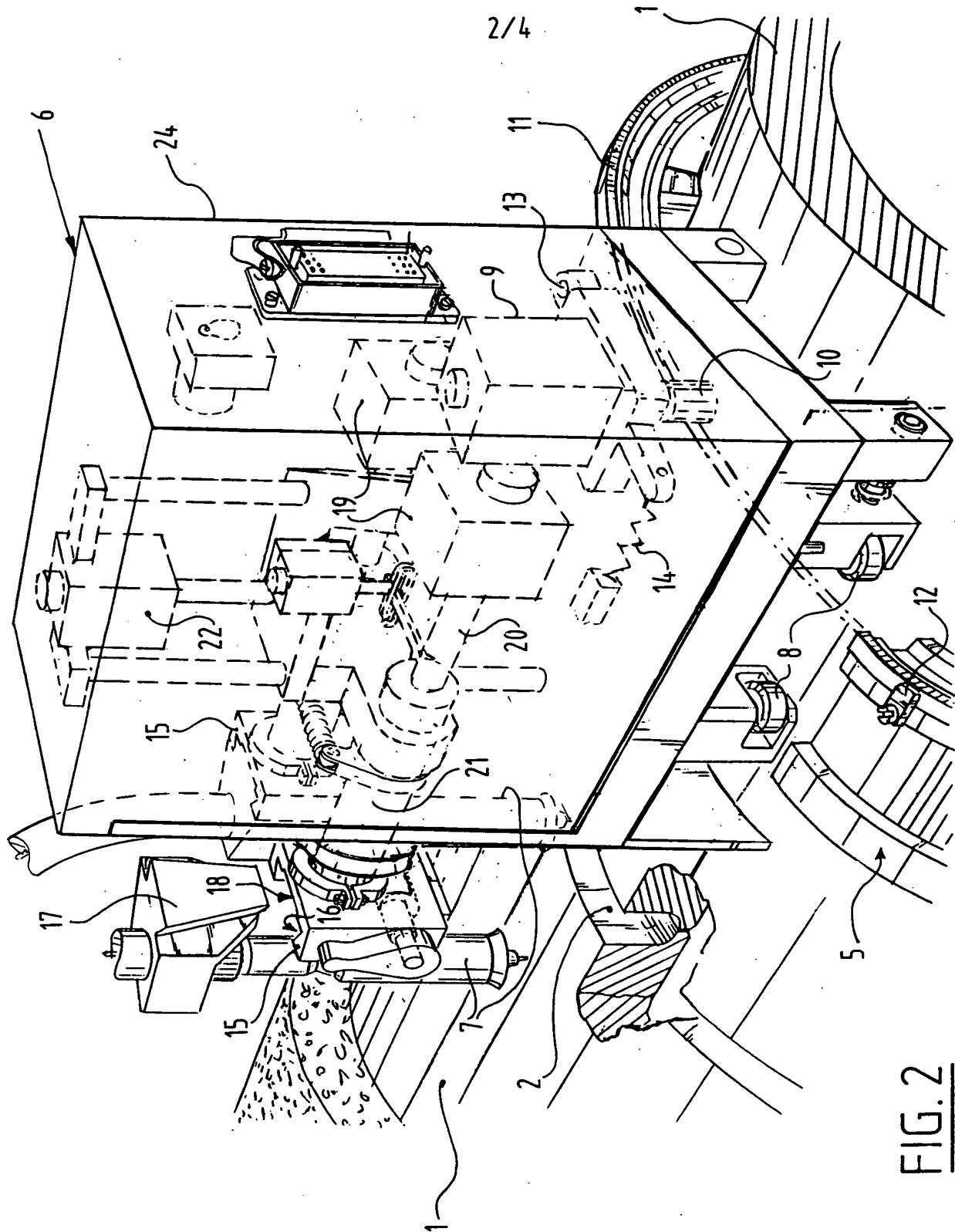


FIG. 1



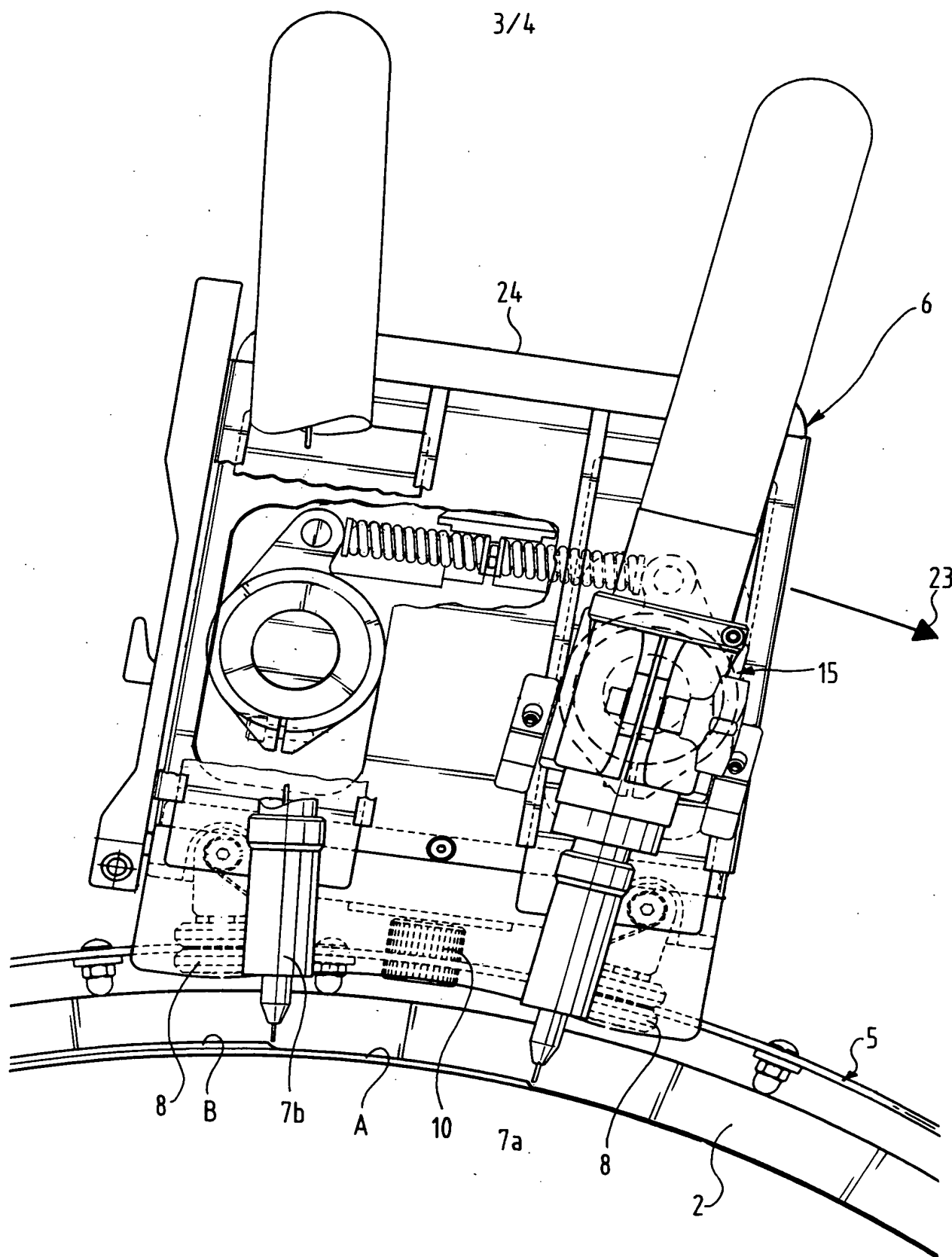


FIG. 3

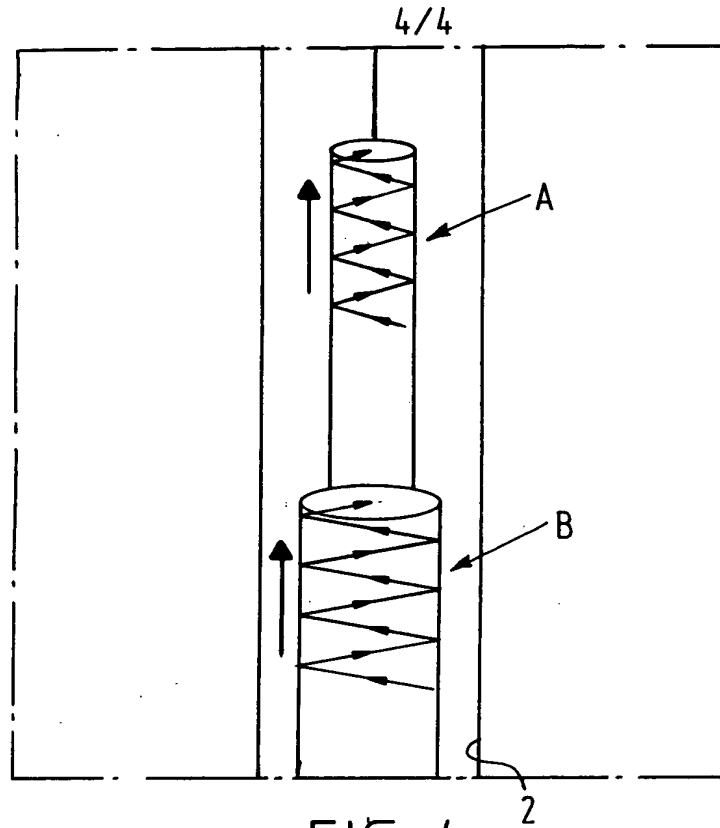


FIG. 4

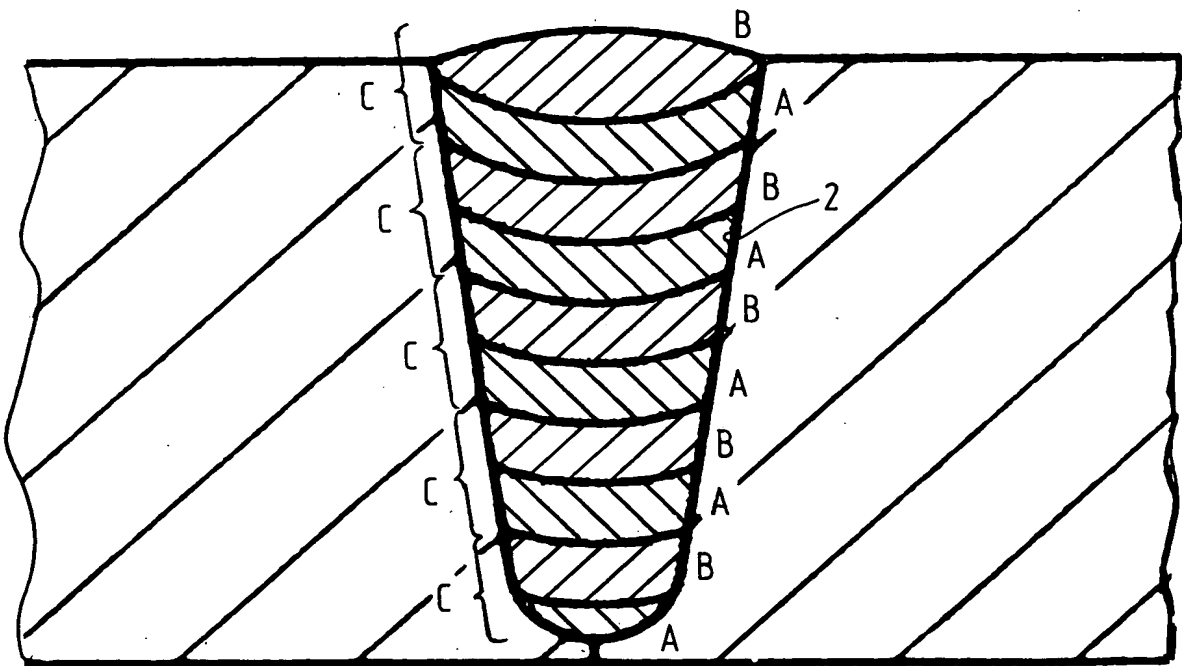


FIG. 5

N/WS85/Mt/eki/31

**Werkwijze n inrichting vo r h t aan elkaar
lassen van twee lichamen.**

De onderhavige uitvinding heeft betrekking op een werkwijze voor het aan elkaar lassen van twee lichamen, bijvoorbeeld pijpen of platen, die onder vrijhouding van een lasgroef in elkaars verlengde tegen
5 elkaar aan worden geplaatst, waarbij de lasgroef met meer dan een laslaag wordt gevuld door middel van een in langsrichting van de lasgroef voortbewogen lastoorts. Tevens heeft de onderhavige uitvinding betrekking op een inrichting voor het aan elkaar lassen van twee lichamen,
10 bijvoorbeeld pijpen of platen, die onder vrijhouding van een lasgroef in elkaars verlengde tegen elkaar aan zijn geplaatst, omvattende tenminste een in langsrichting van de lasgroef leidbare drager voor een lastoorts.

Het is algemeen bekend verbindingen tussen twee
15 pijpen, bijvoorbeeld ter vorming van een pijpleiding, of twee platen te bewerkstelligen door middel van lassen. Daar de maximale neer te smelten dikte van een laslaag beperkt is en de pijpen of de platen vaak te dik zijn om met één enkele laslaag te worden verbonden, wordt een
20 lasverbinding opgebouwd door verscheidene laslagen over elkaar heen te leggen, totdat de lasgroef geheel gevuld is. Een hiervoor geschikte werkwijze en inrichting is bekend uit de Nederlandse octrooiaanvraag 9400742.

De onderhavige uitvinding beoogt de
25 bovengenoemde werkwijze en inrichting te verbeteren.

De werkwijze volgens de uitvinding wordt daartoe gekenmerkt doordat dat door middel van twee op een drager, ten opzichte van de langsrichting van de lasgroef achter elkaar geplaatste lastoortsen in één las-
30 gang twee laslagen worden gelegd. Hiermee wordt een tijdsbesparing in het lasproces verkregen. Dit is met name van belang bij toepassing waar de lastijd van grote invloed is op de economie, zoals het geval is bij de

aanleg van pijpleidingen. In het bijzonder bij het gebruik aan boord van een pijplegschip, is een korte lastijd van belang om een hoge productie te bereiken in aantal lasverbindingen per dag met een beperkt aantal lasinrichtingen. Het aantal lasinrichtingen wordt
5 namelijk begrensd door de afmetingen van het schip.

Indien de lasgroef zich naar buiten divergerende wanden heeft, voert bij voorkeur althans de naijlende lastoorts een oscillerende beweging uit.
10 Hierdoor kan door de naijlende lastoorts een bredere laslaag worden gelegd.

Wanneer de lasgroef in slechts één lasgang met twee laslagen wordt gevuld, kan worden volstaan met het oscilleren van alleen de naijlende lastoorts. Wordt
15 daarentegen de lasgroef gevuld in verscheidene lasgangen, dan wordt zowel de voorlopende als de naijlende lastoorts geoscilleerd. In dit laatste geval wordt bij voorkeur de naijlende lastoorts met een grotere amplitude geoscilleerd dan de voorlopende lastoorts, zodat per
20 lasgang de breedte van de door elke lastoorts neer te leggen laslaag kan worden aangepast aan de breedte van de lasgroef.

Om in dit geval de lasgroef volledig met lasmateriaal te kunnen vullen, kan aan de naijlende lastoorts meer lasmateriaal worden toegevoegd, maar kan
25 ook de naijlende lastoorts met een andere, bij voorkeur hogere frequentie dan de voorlopende lastoorts worden geoscilleerd. De lasbreedte van de beide opeenvolgende laslagen wordt afzonderlijk geregeld doordat zowel de
30 amplitude als de frequentie van de oscillatiebewegingen van de twee lastoortsen onafhankelijk ingesteld en geregeld kunnen worden. Dit biedt het voordeel dat er veel minder beperkingen zijn in de keuze van de lasnaadvorm en dat de lasparameters voor beide toortsen
35 optimaal kunnen worden ingesteld, waardoor in de lastijd optimale besparingen worden bereikt, zonder dat grote concessies in de laskwaliteit (defecten, mechanische eigenschappen) moeten worden gedaan.

In een voorkeursuitvoering van de werkwijze voor het aan elkaar lassen van twee pijpen worden twee dragers met elk twee lastoortsen in omtreksrichting van de pijpen bewogen, waardoor een nog verdere besparing in
5 de lastijd wordt verkregen.

De twee dragers met elk twee lastoortsen kunnen ten opzichte van de omtreksrichting van de pijpen achter elkaar aan worden verplaatst, maar bij voorkeur wordt per lasgang elke drager over een half omtreksdeel van de
10 pijpen bewogen.

Vervolgens wordt bij voorkeur per lasgang elke drager in neergaande omtreksrichting van de pijpen bewogen. Bij toepassing van bepaalde lasprocessen, zoals MIG/MAG-lassen, kan neergaand lassen onder hogere
15 snelheid worden uitgevoerd dan opgaand lassen. De totale lastijd bij het verbinden van twee pijpen is dan ook lager indien slechts neergaand wordt gelast en elke drager na elke lasgang naar zijn uitgangspositie wordt teruggebracht, dan wanneer achtereenvolgens neer- en
20 opgaand wordt gelast.

De onderhavige uitvinding heeft eveneens betrekking op een inrichting voor het aan elkaar lassen van twee pijpen of platen. De inrichting volgens de uitvinding wordt gekenmerkt door twee ten opzichte van de
25 langsrichting van de lasgroef achter elkaar gelegen lastoortsen. Een belangrijk voordeel van deze inrichting is, dat deze compact is en daardoor geschikt is voor het aan elkaar lassen van pijpen met een kleine diameter of van platen met een kleine afmeting.

30 In het geval dat de lasgroef zich naar buiten divergerende wanden heeft, omvat de inrichting volgens de uitvinding bij voorkeur middelen voor het in dwarsrichting van de lasgroef heen en weer bewegen van althans de naijlende lastoorts. Deze middelen kunnen
35 bijvoorbeeld zijn gevormd door een in de drager heen en weer verschuifbaar aangedreven aspen, welke is verbonden met de lastoorts.

De uitvinding zal hierna aan de hand van de bijgevoegde tekeningen nader worden verduidelijkt. In de tekening toont:

5 Figuur 1 een perspectivisch aanzicht van een voorkeursuitvoeringsvorm van de inrichting volgens de uitvinding;

 Figuur 2 op grotere schaal een perspectivisch aanzicht van detail II van figuur 1;

10 Figuur 3 een vooraanzicht van een drager volgens een andere uitvoeringsvorm van de uitvinding;

 Figuur 4 een schematische voorstelling van een lasgang volgens een voorkeursuitvoering van de werkwijze volgens de uitvinding; en

15 Figuur 5 een doorsnede van een met behulp van de werkwijze en inrichting volgens de uitvinding gevulde lasgroef met zich naar buiten divergerende wanden.

 Figuur 1 toont een inrichting voor het aan elkaar lassen van twee pijpen 1, die onder vrijhouding van een lasgroef 2 coaxiaal tegen elkaar aan zijn
20 geplaatst. Een of meer van dergelijke lasinrichtingen kunnen aan boord van een pijplegschip zijn geplaatst om laslagen te leggen in de ringvormige lasgroeven 2 van een in pijlrichting 3 verplaatste pijpleiding 4. Voor de uitleg van de in figuur 1 getoonde en niet voor de
25 onderhavige uitvinding van belang zijnde onderdelen van de lasinrichting wordt verwezen naar de Nederlandse aanvraag 9400742.

 De in figuur 1 getoonde lasinrichting omvat een om één van beide pijpen 1 aangebrachte leidring 5 en twee
30 door de leidring 5 in langsrichting van de lasgroef 2 leidbare drager 6 voor twee ten opzichte van de langsrichting van de lasgroef 2 achter elkaar gelegen lastoortsen 7. Volgens een voorkeursuitvoering van de werkwijze, wordt per lasgang elke drager 6 over een half
35 omtreksdeel in neergaande omtreksrichting van de pijpen bewogen. Dus de ene drager zal de ene helft van de lasgroef van boven naar beneden vullen, en de andere

drager de andere helft. Hierbij zorgt elke drager per lasgang van boven naar beneden voor twee laslagen.

In figuur 2 wordt een perspectivisch aanzicht van detail II van figuur 1 getoond. Aan de onderzijde van de drager 6 bevinden zich leidwielen 8 voor samenwerking met de leidring 5. De drager 6 omvat een huis 24, waarin een motor 9 is aangebracht, die een getande aandrijfrondsel 10 aandrijft, dat in wrijvende aangrijping staat met een aangrijpring 11. Deze uit twee helften bestaande aangrijpring 11 is door middel van klemstukken 12 aan de leidring 5 bevestigd. De motor 9 is zwenkbaar om een as 13 aan het huis 24 van de drager aangebracht. Door middel van een trekveer 14, wordt het aandrijfrondsel 10 van de motor 9 in aanslag met de aangrijpring 11 gehouden.

Aan de kopzijde van het huis 24 van de drager 6 zijn twee toortshouders 15 aangebracht, die elk een wigvormige holte 16 hebben voor het opnemen van een met de lastoorts 7 verbonden wig 17. De lastoorts 7 wordt volgens pijl 18 in de toortshouder 15 aangebracht, waarna de in figuur 2 met gestreepte lijnen getekende stand is verkregen.

Voor het in dwarsrichting van de langsgroef 2 heen en weer bewegen van de lastoortsen 7, is voor elke lastoorts 7 een oscillatiemotor 19 in het huis van de drager 6 voorzien. Elke oscillatiemotor 19 drijft een heen en weer verschuifbare aspen 20 aan, waarbij elke aspen 20 verschuifbaar in een cilinder 21 wordt geleid.

Verder is nog een hefmotor 22 in het huis 24 van de drager 6 opgenomen. De hefmotor 22 dient voor het in radiale richting verstellen van de toortshouders 15, en daarmee dus de lastoortsen 7. In plaats van een gezamenlijke hoogte-instelling voor de lastoortsen 7 kan ook een onafhankelijke hoogte-instelling zijn voorzien.

In figuur 3 wordt een vooraanzicht van een drager volgens een andere uitvoeringsvorm van de uitvinding getoond. De lastoortsen 7a, 7b zijn hier door middel van klembekken 15 met de drager 6 verbonden.

Daarnaast is een op afstand van de pijpen gehouden leidring 5 voorzien, waarmee de leidwielen 8 in contact staan. Er is derhalve geen aangrijpring 11 aanwezig. De twee, ten opzicht van de langsrichting van de lasgroef 2, 5 aangeven met pijl 23, achter elkaar geplaatste lastoortsen 7a, 7b leggen in één lasgang twee laslagen A, B. Omdat de naijlende lastoorts 7b de laslaag B over de door de voorlopende lastoorts 7a neergelegde laslaag A heen legt, is de naijlende lastoorts 7b hoger in zijn 10 toortshouder 15 geplaatst dan de lastoorts 7a. De lastoortsen 7a, 7b zijn radiaal ten opzichte van de pijpen 1 geplaatst, zodat zij onderling een hoek insluiten.

Met behulp van figuur 4 en 5 zal een 15 voorkeursuitvoering van de werkwijze volgens de onderhavige uitvinding worden verduidelijkt. Met pijl A is de lasbeweging van de voorlopende lastoorts 7a aangeduid, en met pijl B die van de naijlende lastoorts 7b. Beide lastoortsen voeren een oscillerende beweging 20 uit, waarbij de naijlende lastoorts 7b met een grotere amplitude en een hogere frequentie wordt geoscilleerd dan de voorlopende lastoorts 7a. Door middel van deze werkwijze wordt een lasgroef 2 gevuld, die zich naar buiten divergerende wanden heeft. Aangezien de lasgroef 2 25 zich naar buiten toe verwijdt, moet de naijlende lastoorts 7b in elke lasgang een bredere laslaag neerleggen dan de voorlopende lastoorts 7a en wordt deze derhalve met een grotere amplitude geoscilleerd dan de voorlopende lastoorts 7a. Daarnaast wordt de naijlende 30 lastoorts 7b bij voorkeur met een hogere frequentie geoscilleerd dan de voorlopende lastoorts 7a teneinde met eenzelfde hoeveelheid materiaal de bredere lasgroef 2 te kunnen vullen. Per lasgang worden de amplitude en frequentie van de oscillatiebeweging van elke lastoorts 35 7a, 7b aan de breedte van de te vullen lasgroef 2 aangepast.

In figuur 5 wordt het uiteindelijke resultaat getoond van een in vijf lasgangen C gevulde V-vormige

lasgroef 2. Per lasgang C zijn telkens twee laslagen A,B door twee achter elkaar geplaatste lastoortsen 7a,7b gelegd.

Indien er zowel neer- als opgaand wordt gelast, 5 wordt bij elk keerpunt de voorlopende lastoorts de naijlende lastoorts, en wordt de naijlende lastoorts de voorlopende lastoorts. Het is echter voordeliger om alleen neergaand te lassen, waarbij bij voorkeur twee dragers met elk twee lastoortsen over een half 10 omtreksdeel van de pijpen wordt bewogen, omdat dit met een grotere snelheid kan plaatsvinden dan opgaand lassen en in het totale lasproces een tijdsbesparing wordt verkregen.

Andere middelen voor het in dwarsrichting van 15 de lasgroef heen en weer bewegen van althans de naijlende lastoorts dan de getoonde en beschreven oscillatiemotor 19 zijn mogelijk, bijvoorbeeld een zwenkarm.

In de tekeningen wordt een lasinrichting met twee dragers getoond, waarbij elke drager is voorzien van 20 twee lastoortsen. De uitvinding is echter niet hiertoe beperkt. Er kunnen bijvoorbeeld ook vier dragers worden toegepast, waarbij elke drager een kwart omtreksdeel van de pijpen voor zijn rekening neemt. Dit kan van voordeel zijn bij het lassen van pijpen met een grote diameter. 25 Daarnaast kunnen ook meer dan twee lastoortsen per drager worden voorzien, waarbij elke lastoorts onafhankelijk met een op de breedte van de lasgroef aangepaste amplitude en frequentie geoscilleerd kan worden.

Tevens kan een verbinding tussen twee pijpen 30 ook met meer dan één lasinrichting worden gelast, zoals gebruikelijk is op een pijplegschip.

Conclusi s

1. Werkwijze voor het aan elkaar lassen van twee lichamen, bijvoorbeeld pijpen of platen, die onder vrijhouding van een lasgroef in elkaars verlengde tegen elkaar aan worden geplaatst, waarbij de lasgroef met meer
5 dan een laslaag wordt gevuld door middel van een in langsrichting van de lasgroef voortbewogen lastoorts, **met het kenmerk**, dat door middel van twee, ten opzichte van de langsrichting van de lasgroef op voorafbepaalde vaste afstand achter elkaar geplaatste lastoortsen in één las-
10 gang twee laslagen worden gelegd.

2. Werkwijze volgens conclusie 1, waarbij de lasgroef zich naar buiten divergerende wanden heeft, **met het kenmerk**, dat althans de naijlende lastoorts een oscillerende beweging uitvoert.

15 3. Werkwijze volgens conclusie 2, **met het kenmerk**, dat de naijlende lastoorts met een grotere amplitude wordt geoscilleerd dan de voorlopende lastoorts.

20 4. Werkwijze volgens conclusie 3, **met het kenmerk**, dat de naijlende lastoorts met een andere frequentie wordt geoscilleerd dan de voorlopende lastoorts.

5. Werkwijze voor het aan elkaar lassen van twee pijpen volgens een van de voorgaande conclusies, **met**
25 **het kenmerk**, dat twee dragers met elk twee lastoortsen in omtreksrichting van de pijpen worden bewogen.

6. Werkwijze volgens conclusie 5, **met het kenmerk**, dat per lasgang elke drager over een half omtreksdeel van de pijpen wordt bewogen.

30 7. Werkwijze volgens conclusie 6, **met het kenmerk**, dat per lasgang elke drager in neergaande omtreksrichting van de pijpen wordt bewogen.

8. Inrichting voor het aan elkaar lassen van twee lichamen, bijvoorbeeld pijpen of platen, die onder
35 vrijhouding van een lasgroef in elkaars verlengde tegen elkaar aan zijn geplaatst, omvattende tenminste een in

langsrichting van de lasgroef leidbare drager voor een lastoorts, **gek nmerkt** door twee ten opzichte van de langsrichting van de lasgroef achter elkaar gelegen lastoortsen.

5 9. Inrichting volgens conclusie 8, waarbij de lasgroef zich naar buiten divergerende wanden heeft, **gekenmerkt** door middelen voor het in dwarsrichting van de lasgroef heen en weer bewegen van althans de naijlende lastoorts.

10 10. Inrichting volgens conclusie 9, **met het kenmerk**, dat die middelen zijn gevormd door een in de drager heen en weer verschuifbaar aangedreven aspen, welke is verbonden met de lastoorts.

Uittr ks 1

Een werkwijze voor het aan elkaar lassen van twee lichamen, bijvoorbeeld pijpen of platen, die onder
5 vrijhouding van een lasgroef in elkaars verlengde tegen elkaar aan worden geplaatst, waarbij de lasgroef met meer dan een laslaag wordt gevuld door middel van een in langsrichting van de lasgroef voortbewogen, en waarbij door middel van twee, ten opzichte van de langsrichting
10 van de lasgroef op voorafbepaalde vaste afstand achter elkaar geplaatste lastoortsen in één lasgang twee laslagen worden gelegd, zodat een tijdsbesparing in het lasproces wordt verkregen. De uitvinding heeft daarnaast betrekking op een inrichting voor het aan elkaar lassen
15 van twee lichamen, welke inrichting twee ten opzichte van de langsrichting van de lasgroef achter elkaar gelegen lastoortsen omvat.



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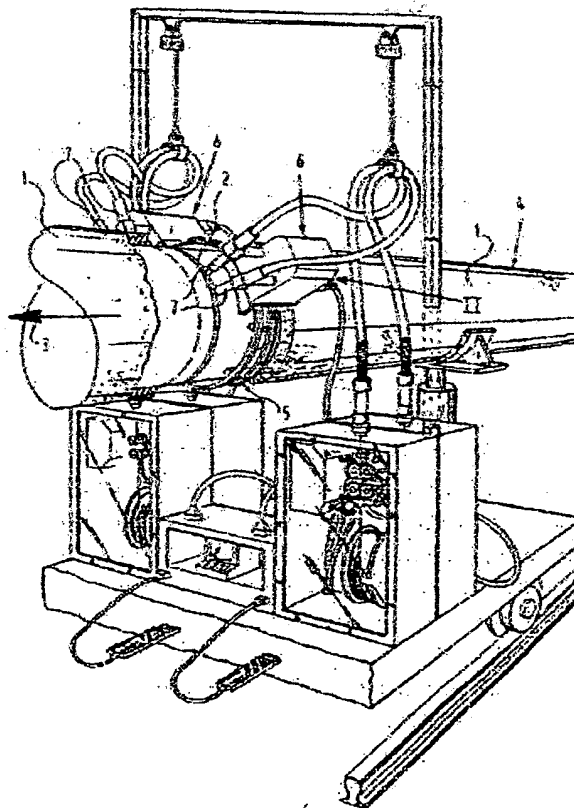
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

In English translation (filed in Dutch).

(54) Title: METHOD AND DEVICE FOR WELDING TOGETHER TWO BODIES

(57) Abstract

A method for welding together two bodies, for instance pipes or plates, which are placed mutually in line against each other while leaving clear a weld groove, wherein the weld groove is filled with more than one welding layer by means of a welding torch moved in longitudinal direction of the weld groove, and wherein two welding layers are laid in one welding pass by means of two welding torches placed successively at a predetermined fixed distance in the longitudinal direction of the weld groove, so that a time-saving is achieved in the welding process. The invention also relates to a device for welding together two bodies, which device comprises two welding torches lying successively in the longitudinal direction of the weld groove.



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CLAIMS

1. Method for welding together two bodies, for instance pipes or plates, which are placed mutually in line against each other while leaving clear a weld groove, wherein the weld groove is filled with more than one welding layer by means of a welding torch moved in longitudinal direction of the weld groove, characterized in that two welding layers are laid in one welding pass by means of two welding torches placed successively at a predetermined fixed distance in the longitudinal direction of the weld groove.

2. Method as claimed in claim 1, wherein the weld groove has outward diverging walls, characterized in that at least the trailing welding torch performs an oscillating movement.

3. Method as claimed in claim 2, characterized in that the trailing welding torch is oscillated at a greater amplitude than the leading welding torch.

4. Method as claimed in claim 3, characterized in that the trailing welding torch is oscillated at a frequency differing from that of the leading welding torch.

5. Method for welding together two pipes as claimed in any of the preceding claims, characterized in that two carriers each having two welding torches are moved in peripheral direction of the pipes.

6. Method as claimed in claim 5, characterized in that each carrier is moved per welding pass over half a peripheral part of the pipes.

7. Method as claimed in claim 6, characterized in that each carrier is moved per welding pass in downward peripheral direction of the pipes.

8. Device for welding together two bodies, for instance pipes or plates, which are placed mutually in line against each other while leaving clear a weld groove, comprising at least one carrier for a welding torch guidable in longitudinal direction of the weld

groove, characterized by two welding torches lying successively in the longitudinal direction of the weld groove.

9. Device as claimed in claim 8, wherein the weld
5 groove has outward diverging walls, characterized by means for moving at least the trailing welding torch reciprocally in transverse direction of the weld groove.

10. Device as claimed in claim 9, characterized in
that these means are formed by a shaft pin driven for
10 reciprocal sliding in the carrier and connected to the welding torch.

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/NL 00/00072

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B23K9/028

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B23K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 3 922 517 A (NELSON ET AL.) 25 November 1975 (1975-11-25) column 9, line 29 - line 60; figure 4	1-3,8-10
Y	US 5 347 101 A (BRENNAN ET AL.) 13 September 1994 (1994-09-13) column 3, paragraph 2 - paragraph 4; figures 2,4	1-3,8-10
A	US 4 373 125 A (KAZLAUSKAS) 8 February 1983 (1983-02-08) column 7, paragraph 3 - column 8, paragraph 4; figure 1	4-7

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Date of the actual completion of the international search

9 May 2000

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No.

PCT/NL 00/00072

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3922517 A	25-11-1975	GB 1427329 A CA 1003504 A IT 988294 B	10-03-1976 11-01-1977 10-04-1975
US 5347101 A	13-09-1994	NO 950096 A	08-08-1995
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METHOD AND DEVICE FOR WELDING TOGETHER TWO BODIES

The present invention relates to a method for welding together two bodies, for instance pipes or plates, which are placed mutually in line against each other while leaving clear a weld groove, wherein the weld
5 groove is filled with more than one welding layer by means of a welding torch moved in longitudinal direction of the weld groove. The present invention also relates to a device for welding together two bodies, for instance pipes or plates, which are placed mutually in line
10 against each other while leaving clear a weld groove, comprising at least one carrier for a welding torch guidable in longitudinal direction of the weld groove.

It is generally known to realize connections between two pipes, for instance to form a pipeline, or two plates
15 by means of welding. Since the maximum thickness of a welding layer which can be deposited is limited and the pipes or plates are often too thick to be connected with a single welding layer, a welded connection is built up by laying several welding layers over each other until
20 the weld groove is wholly filled. A method and device suitable for this purpose is known from the Netherlands patent application 9400742.

The present invention has for its object to improve the above stated method and device.

25 The method according to the invention is characterized for this purpose in that two welding layers are laid in one welding pass by means of two welding torches placed successively on a carrier in the longitudinal direction of the weld groove. A time-saving
30 is hereby obtained in the welding process. This is of particular importance in applications where the welding time is of great economic influence, such as is the case in laying pipelines. Particularly in the use aboard a pipelaying vessel, a short welding time is important in

achieving a high production in the number of welded connections per day with a limited number of welding devices. This is because the number of welding devices is limited by the dimensions of the ship.

- 5 If the weld groove has outward diverging walls, at least the trailing torch preferably performs an oscillating movement. A wider welding layer can hereby be laid by the trailing welding torch.

10 When the weld groove is filled with two welding layers in only one welding pass, oscillation of only the trailing welding torch can suffice. If on the other hand the weld groove is filled in several welding passes, both the leading and trailing welding torch are then oscillated. In this latter case the trailing welding
15 torch is preferably oscillated at a greater amplitude than the leading welding torch, so that the width of the welding layer to be deposited per welding pass by each welding torch can be adjusted to the width of the weld groove.

- 20 In order in this case to enable complete filling of the weld groove with welding material, more welding material can be added to the trailing welding torch, although the trailing welding torch can also be oscillated at a different, preferably higher, frequency
25 than the leading welding torch. The weld width of the two successive welding layers is separately controlled in that both the amplitude and the frequency of the oscillation movements of the two welding torches can be individually adjusted and controlled. This provides the
30 advantage that there are far fewer limitations in the choice of the form of the welding seam, and that the welding parameters for both torches can be optimally adjusted, whereby optimum savings are achieved in the welding time without great concessions having to be made
35 in the weld quality (defects, mechanical properties).

In a preferred embodiment of the method for welding together two pipes, two carriers each having two welding torches are moved in peripheral direction of the pipes,

thereby achieving a still further saving in the welding time.

The two carriers each having two welding torches can be displaced successively in the peripheral direction of the pipes, but in preference each carrier is moved per
5 welding pass over half a peripheral part of the pipes.

Each carrier is then preferably moved per welding pass in downward peripheral direction of the pipes. When particular welding processes are used, such as MIG/MAG
10 welding, downward welding can be performed at higher speed than upward welding. The total welding time in the connection of two pipes is therefore less if welding takes place in only downward direction and each carrier is returned to its starting position after each welding
15 pass than if welding takes place downward and then upward.

The present invention likewise relates to a device for welding together two pipes or plates. The device according to the invention is characterized by two
20 welding torches lying successively in the longitudinal direction of the weld groove. A significant advantage of this device is that it is compact and thereby suitable for welding together pipes of small diameter or plates of small size.

25 In the case the weld groove has outward diverging walls, the device according to the invention preferably comprises means for moving at least the trailing welding torch reciprocally in transverse direction the weld groove. These means can for instance be formed by a shaft
30 pin driven for reciprocal sliding in the carrier and connected to the welding torch.

The invention will be further elucidated hereinbelow with reference to the annexed drawings. In the drawing:

Figure 1 shows a perspective view of a preferred
35 embodiment of the device according to the invention;

Figure 2 shows on a larger scale a perspective view of detail II of figure 1;

Figure 3 shows a front view of a carrier according to another embodiment of the invention;

Figure 4 is a schematic representation of a welding pass according to a preferred embodiment of the method according to the invention; and

Figure 5 shows a cross-section of a weld groove with outward diverging walls filled using the method and device according to the invention.

Figure 1 shows a device for welding together two pipes 1 which are placed coaxially against each other while leaving clear a weld groove 2. One or more of such welding devices can be placed on board a pipelaying vessel to lay welding layers in the annular weld grooves 2 of a pipeline 4 displaced in arrow direction 3. For an explanation of the components of the welding device shown in figure 1 and not significant for the present invention reference is made to the Netherlands patent application 9400742.

The welding device shown in figure 1 comprises a guide ring 5 arranged round one of the two pipes 1 and two carriers 6 for two welding torches 7 lying successively in the longitudinal direction of weld groove 2, which carriers can be guided by guide ring 5 in lengthwise direction of weld groove 2. According to a preferred embodiment of the method, each carrier 6 is moved per welding pass through half a peripheral part in downward peripheral direction of the pipes. The one carrier will thus fill the one half of the weld groove from top to bottom and the other carrier the other half. Each carrier herein provides two welding layers from top to bottom per welding pass.

Figure 2 shows a perspective view of detail II of figure 1. On the underside of carrier 6 are situated guide wheels 8 for co-action with guide ring 5. Carrier 6 comprises a housing 24 in which is arranged a motor 9 which drives a geared drive pinion 10 which is in frictional contact with an engaging ring 11. This engaging ring 11 consisting of two halves is fixed to

guide ring 5 by means of clamping pieces 12. Motor 9 is arranged pivotally on a shaft 13 on the housing 24 of the carrier. The drive pinion 10 of motor 9 is held in contact with engaging ring 11 by means of a draw spring 14.

Arranged on the end face of housing 24 of carrier 6 are two torch holders 15 which each have a wedge-shaped cavity 16 for receiving a wedge 17 connected to welding torch 7. Welding torch 7 is arranged as according to arrow 18 in torch holder 15, whereafter the position drawn in dashed lines in figure 2 is obtained.

For reciprocal movement of welding torches 7 in transverse direction of longitudinal groove 2, an oscillating motor 19 for each welding torch 7 is provided in the housing of carrier 6. Each oscillating motor 19 drives a reciprocally slidable shaft pin 20, wherein each shaft pin 20 is guided slidably in a cylinder 21.

A lifting motor 22 is further arranged in housing 24 of carrier 6. Lifting motor 22 serves to adjust torch holders 15, and thereby also welding torches 7, in radial direction. An independent height adjustment can also be provided for welding torches 7 instead of a collective height adjustment.

Figure 3 shows a front view of a carrier according to another embodiment of the invention. Welding torches 7a, 7b are connected here to carrier 6 by means of clamping jaws 15. In addition, there is provided a guide ring 5 which is held at a distance from the pipes and with which guide wheels 8 are in contact. No engaging ring 11 is therefore present. The two welding torches 7a, 7b placed successively in longitudinal direction of weld groove 2, indicated with arrow 23, lay two welding layers A, B in one welding pass. Because the trailing welding torch 7b lays welding layer B over the welding layer A deposited by the leading welding torch 7a, the trailing welding torch 7b is placed higher in its torch holder 15 than welding torch 7a. Welding torches 7a, 7b

are placed radially relative to pipes 1 so that they enclose a mutual angle.

Using figure 4 and 5 a preferred embodiment of the method according to the present invention will be elucidated. Arrow A designates the welding movement of the leading welding torch 7a and arrow B that of the trailing welding torch 7b. Both welding torches perform an oscillating movement, wherein the trailing welding torch 7b is oscillated at a greater amplitude and a higher frequency than the leading welding torch 7a. By means of this method a weld groove 2 is filled which has outward diverging walls. Since weld groove 2 widens towards the outside, the trailing welding torch 7b must in each welding pass deposit a wider welding layer than leading welding torch 7a, and is therefore oscillated at a greater amplitude than leading welding torch 7a. In addition, the trailing welding torch 7b is preferably oscillated at a higher frequency than leading welding torch 7a in order to enable filling of the wider weld groove 2 with the same quantity of material. The amplitude and frequency of the oscillation movement of each welding torch 7a, 7b is adapted per welding pass to the width of the weld groove 2 for filling.

Figure 5 shows the final result of a V-shaped weld groove 2 filled in five welding passes C. Two welding layers A, B are laid at a time per welding pass C by two successively placed welding torches 7a, 7b.

If both downward and upward welding take place, at each turning point the leading welding torch becomes the trailing welding torch and the trailing welding torch becomes the leading welding torch. It is more advantageous however to only weld downward, wherein two carriers each having two welding torches are preferably moved over half a peripheral part of the pipes, because this can take place at greater speed than upward welding and a time-saving is achieved in the total welding process.

Means for moving at least the trailing welding torch reciprocally in transverse direction of the weld groove other than the shown and described oscillator motor 19 are possible, for instance a pivot arm.

5 The drawing shows a welding device with two carriers, wherein each carrier is provided with two welding torches. The invention is however not limited hereto. Four carriers can for instance also be applied, wherein each carrier covers a quarter peripheral part of
10 the pipes. This can be advantageous in welding pipes with a large diameter. In addition, more than two welding torches can also be provided per carrier, wherein each welding torch can be oscillated independently with an amplitude and frequency adapted to the width of the weld
15 groove.

A connection between two pipes can also be welded with more than one welding device, as is usual on a pipe-laying vessel.

CLAIMS

1. Method for welding together two bodies, for instance pipes or plates, which are placed mutually in line against each other while leaving clear a weld groove, wherein the weld groove is filled with more than one welding layer by means of a welding torch moved in longitudinal direction of the weld groove, **characterized in that** two welding layers are laid in one welding pass by means of two welding torches placed successively at a predetermined fixed distance in the longitudinal direction of the weld groove.

2. Method as claimed in claim 1, wherein the weld groove has outward diverging walls, **characterized in that** at least the trailing welding torch performs an oscillating movement.

3. Method as claimed in claim 2, **characterized in that** the trailing welding torch is oscillated at a greater amplitude than the leading welding torch.

4. Method as claimed in claim 3, **characterized in that** the trailing welding torch is oscillated at a frequency differing from that of the leading welding torch.

5. Method for welding together two pipes as claimed in any of the preceding claims, **characterized in that** two carriers each having two welding torches are moved in peripheral direction of the pipes.

6. Method as claimed in claim 5, **characterized in that** each carrier is moved per welding pass over half a peripheral part of the pipes.

7. Method as claimed in claim 6, **characterized in that** each carrier is moved per welding pass in downward peripheral direction of the pipes.

8. Device for welding together two bodies, for instance pipes or plates, which are placed mutually in line against each other while leaving clear a weld groove, comprising at least one carrier for a welding torch guidable in longitudinal direction of the weld

groove, **characterized by** two welding torches lying successively in the longitudinal direction of the weld groove.

9. Device as claimed in claim 8, wherein the weld
5 groove has outward diverging walls, **characterized by**
means for moving at least the trailing welding torch
reciprocally in transverse direction of the weld groove.

10. Device as claimed in claim 9, **characterized in**
that these means are formed by a shaft pin driven for
10 reciprocal sliding in the carrier and connected to the
welding torch.

1/4

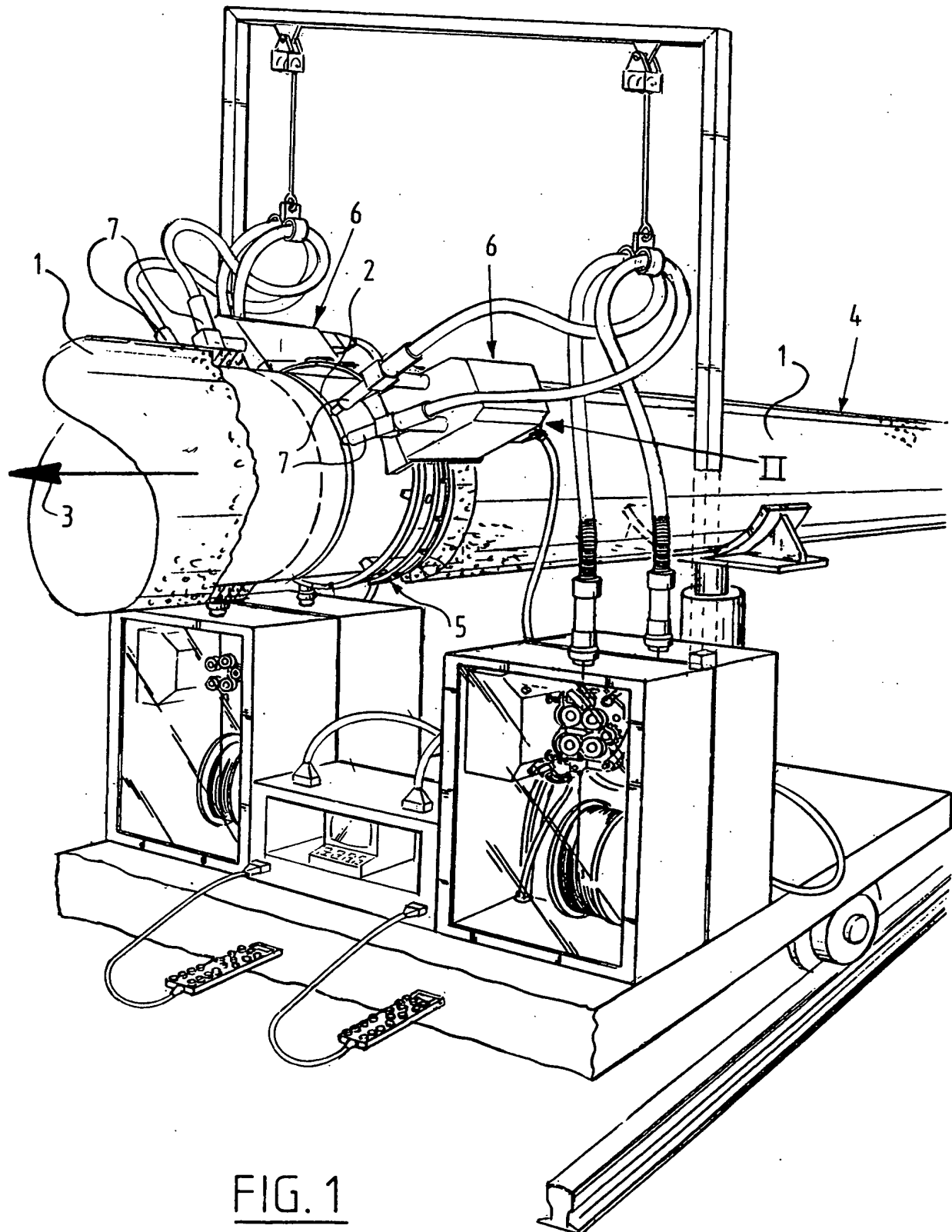


FIG. 1

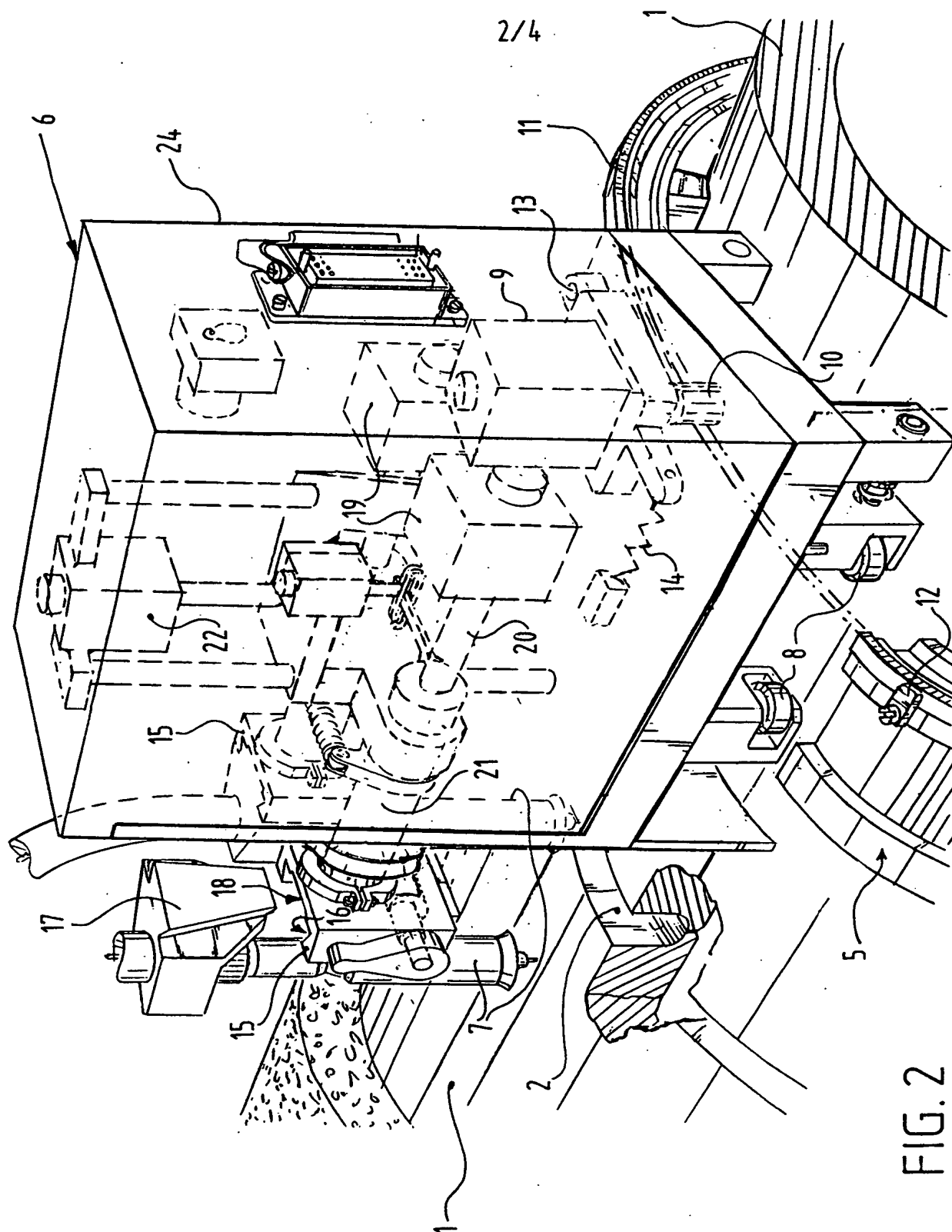


FIG. 2

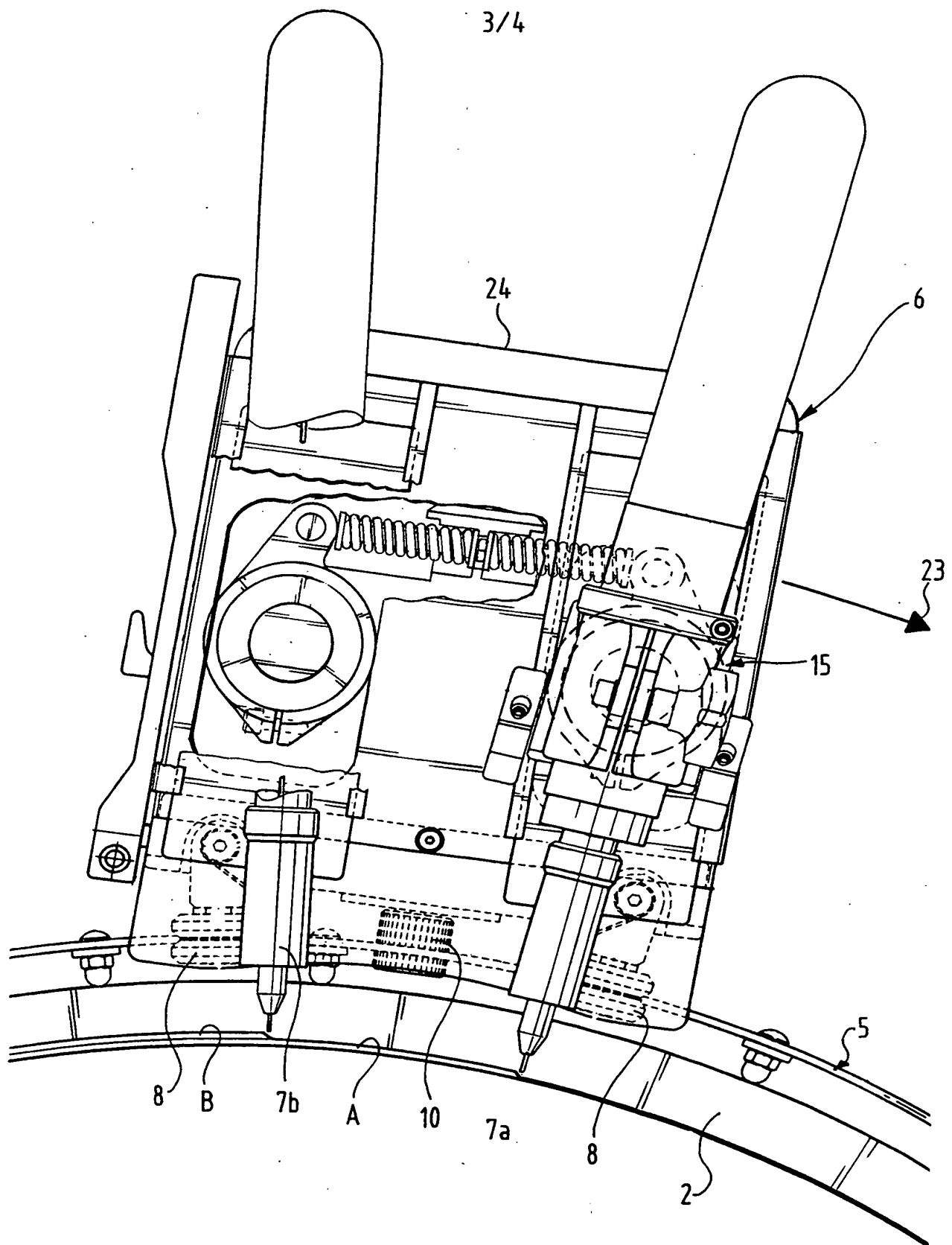


FIG. 3

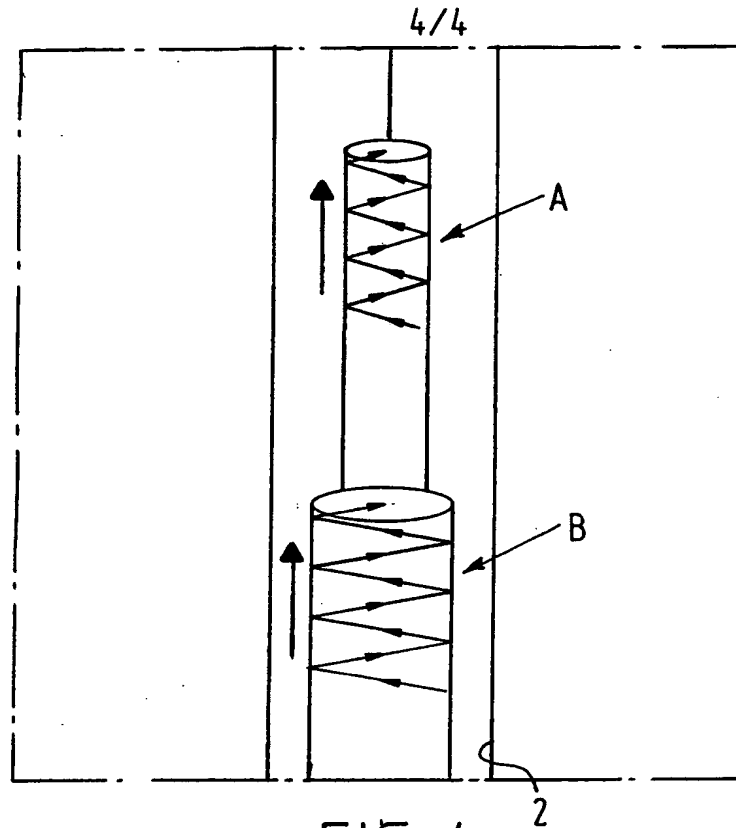


FIG. 4

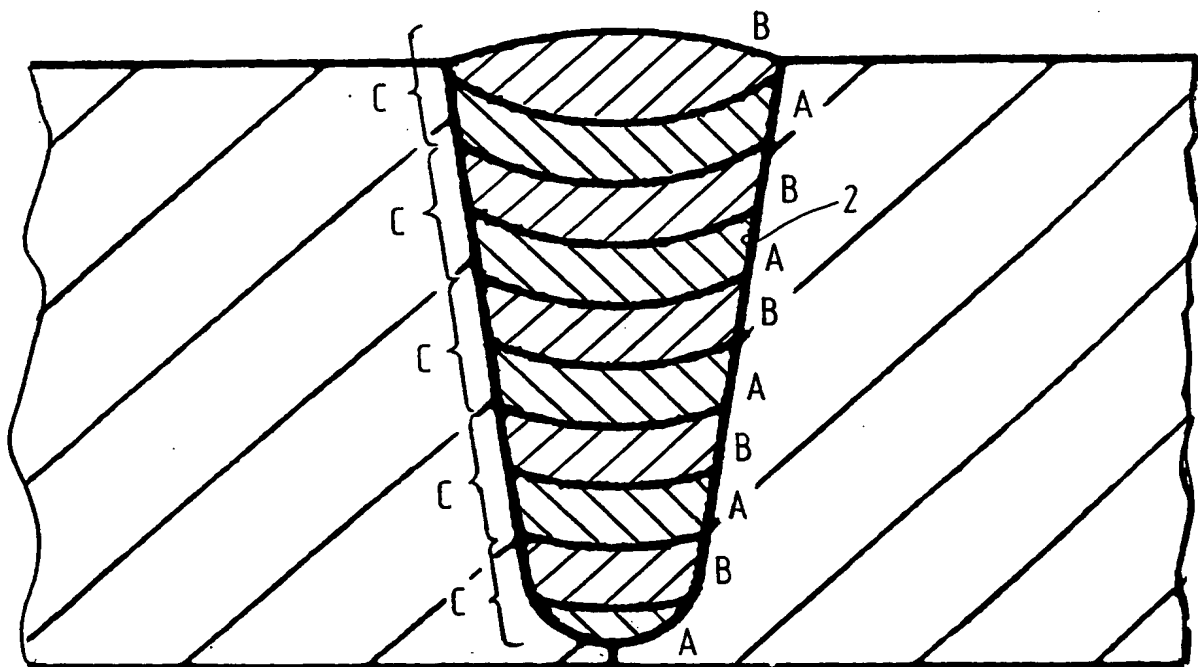


FIG. 5

INTERNATIONAL SEARCH REPORT

International Application No

PCT/NL 00/00072

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B23K9/028

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B23K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 3 922 517 A (NELSON ET AL.) 25 November 1975 (1975-11-25) column 9, line 29 - line 60; figure 4	1-3,8-10
Y	US 5 347 101 A (BRENNAN ET AL.) 13 September 1994 (1994-09-13) column 3, paragraph 2 - paragraph 4; figures 2,4	1-3,8-10
A	US 4 373 125 A (KAZLAUSKAS) 8 February 1983 (1983-02-08) column 7, paragraph 3 -column 8, paragraph 4; figure 1	4-7

☐

Further documents are listed in the continuation of box C.

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Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
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US 5347101 A	13-09-1994	NO 950096 A	08-08-1995
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